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ECONOMIC INTELLIGENCE REPORT

PRODUCTION OF LOCOMOTIVES AND ROLLING STOCK IN COMMUNIST CHINA



CIA/RR 34

4 June 1954

CENTRAL INTELLIGENCE AGENCY

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(ORR Project 32.220)

CENTRAL INTELLIGENCE AGENCY

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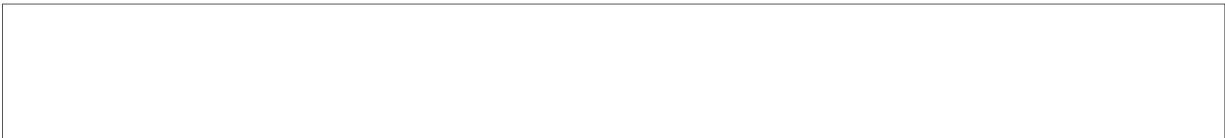
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PRODUCTION OF LOCOMOTIVES AND ROLLING STOCK
IN COMMUNIST CHINA*

Summary and Conclusions

The production of locomotives and rolling stock in Communist China is carried on with the bare minimum of essential machinery and tools. It also is limited by a considerable degree of dependence on imported components and by the requirements of the state railroad (which controls the producing plants) for major repairs of existing equipment.

The railroad equipment industry in China developed in two distinct geographical areas. The major part of the industry, developed in Manchuria under Japanese control, was centered in 4 plants in Dairen (Ta-lien) and 3 in Mukden (Shen-yang). It was designed chiefly for the assembly of imported components. Production in Manchuria in 1944 totaled about 110 steam locomotives and 3,000 freight cars -- roughly one-half of estimated capacity. Soviet dismantling after World War II left only a fraction of this capacity operational. In China proper there was no production prior to 1937, when the Japanese occupied North China. The Japanese equipped two shops in that area for assembly operations. After World War II the Chinese Nationalists began the reconstruction of another shop in Hunan Province, which they planned to equip (with UNRRA aid) for the production of locomotives and rolling stock.

Since 1949 the Chinese Communist regime, with Soviet help, has been rebuilding the railroad equipment industry. At present it is estimated that there are nine plants in Communist China which are engaged, or which are capable of engaging, in the production of locomotives or rolling stock or both. They consist of 1 plant in Mukden, 4 in Dairen, 1 in T'ang-shan, 1 in Ssu-fang, 1 in Chu-chou, and 1 in Ch'ang-hsien. Total production of the industry in 5 years under Communist control (1949-53) is estimated at about 180 steam locomotives, 6,600 freight cars, and 40 passenger cars. Production in 1953 is estimated at 85 steam locomotives, 2,500 freight cars, and 20 passenger cars.

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 28 February 1954.

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It is believed that Communist China has imported a considerable amount of component parts for railroad equipment, without which this level of production could not have been attained. Communist China has also imported finished equipment, at an annual rate estimated for 1951-53 at 15 to 40 locomotives, about 300 freight cars, and perhaps 20 passenger cars.

It appears that at present the domestic supply of railroad equipment in Communist China, even including that part which is dependent on imported components, does not meet the essential requirements* of the economy for new equipment and replacements.

Assuming an optimum set of factors, maximum production capacity by the end of 1956 could not be more than approximately 400 locomotives, 7,600 freight cars, and 335 passenger cars. In 1948, before the Communists gained control, the maximum annual requirements of China were expected to reach about twice this amount. On the basis of this estimate, Communist China would be able to manufacture not more than one-half of the required amounts of railroad equipment in the next few years, assuming imports of necessary components. For the remaining one-half of its requirements, Communist China would be dependent on imports of finished equipment.

I. Introduction.

The railroad equipment industry of Communist China produces locomotives and rolling stock of relatively few types. The industry operates under several limitations. It is in considerable part devoted to the repair and reconditioning of old equipment. The production of new equipment is dependent to a considerable extent on imported components. The industry operates with a bare minimum of essential machinery and tools, which are of diverse origin.

* This report does not deal with the operational requirements for locomotives and rolling stock. Inventory at the end of 1952 is estimated to have been 3,000 locomotives and 56,000 freight cars (plus or minus 4,000 cars).

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A. Products of the Industry.

1. Locomotives.

Communist China produces a small number of main-line and switching service locomotives (standard gage),* all powered by steam. There is no firm evidence of significant production of locomotives for other purposes (such as mining locomotives or industrial and plant locomotives) or of electric or diesel types.

2. Rolling Stock.

Communist China produces a considerable number of freight cars, mainly flatcars and boxcars. There is no direct evidence concerning the production of other types of freight cars (such as tank, hopper, and refrigerator cars). This report does not consider the production of special-purpose cars such as mine cars and industrial and plant cars. Communist China also produces a small number of passenger cars.

B. History of the Industry.

The historical development of the railroad equipment industry in China is related to the political history of the two major areas, China proper and Manchuria, since 1931, presented in outline in Figure 1.**

1. Manchuria.

The railroad equipment industry of Manchuria (Manchukuo) was established and equipped under the influence and direction of the Japanese. In the peak year, 1944, actual production amounted to 112 locomotives and 2,998 freight cars, or about half of capacity (200 locomotives and 6,000 freight cars). 1/**

* Locomotives and rolling stock produced in China are standard gage (4 feet 8-1/2 inches).

** P. 4, below.

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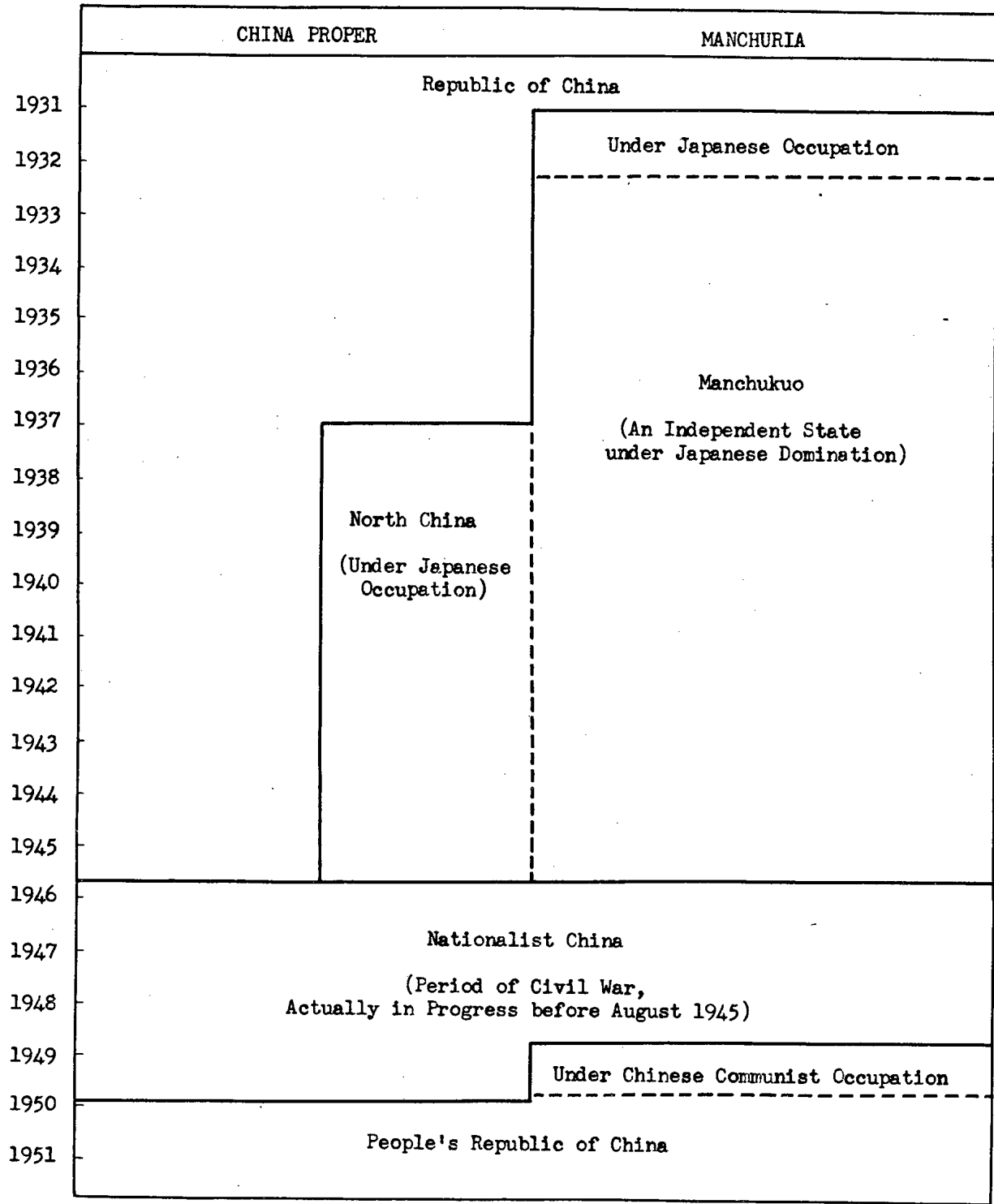


FIGURE 1. Chronology of Political Changes in China since 1931.

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FIGURE 2. Temporary Foundry Cupola at the Chu-chou Locomotive Works, 1949.

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FIGURE 3. Extension to the Locomotive Shop under Construction at the Chu-chou Locomotive Works, 1949.

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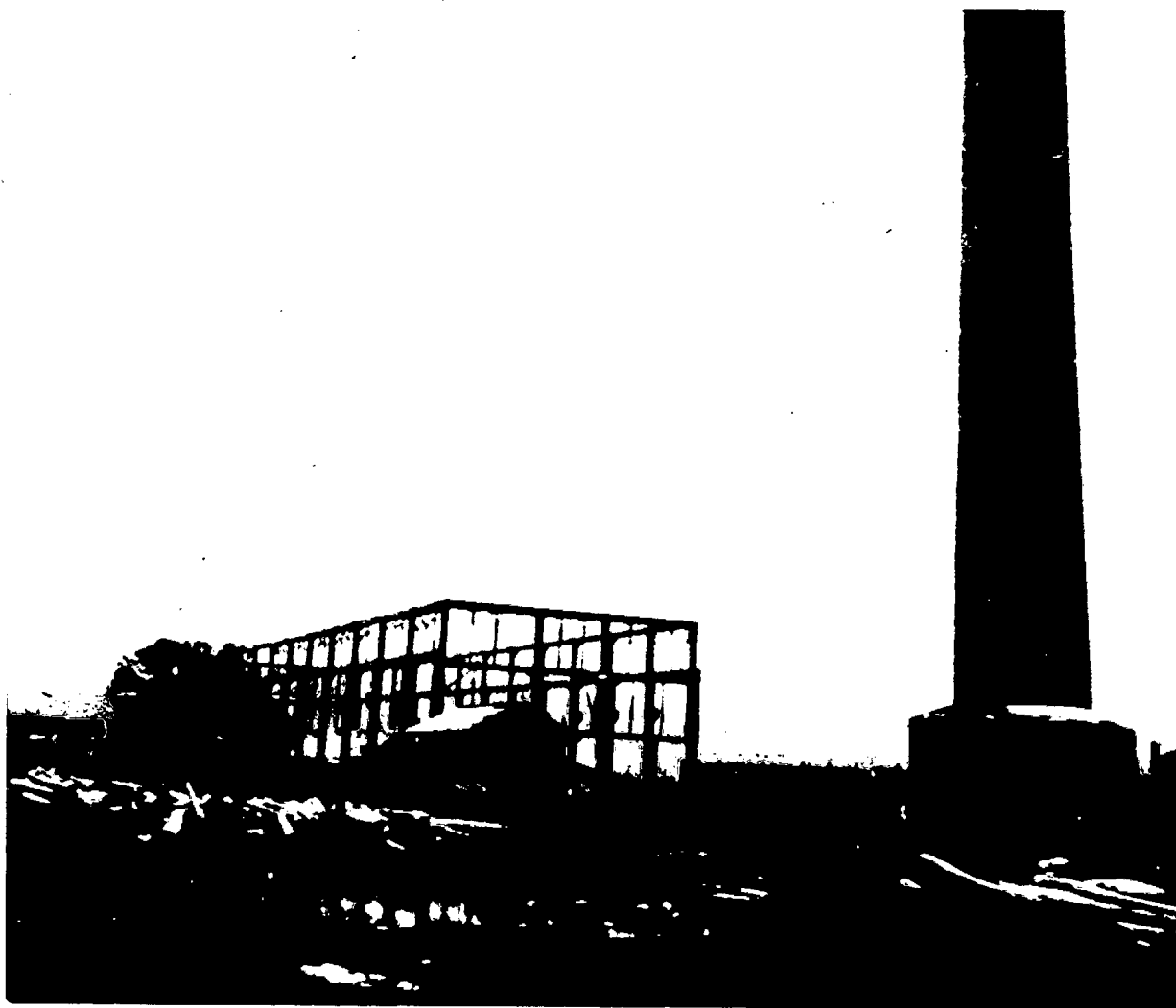


FIGURE 4. Unfinished Locomotive Shop at the Chu-chou Locomotive Works, 1949.

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FIGURE 5. Extension to the Locomotive Shop under Construction at the Chu-chou Locomotive Works, 1949. Note the cupola at the right rear of the picture. This is not the cupola shown in Figure 2.

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Two cities, Dairen (Ta-lien) and Mukden (Shen-yang), accounted for the entire production of railroad equipment in Manchuria. Locomotives and rolling stock were produced at the South Manchurian Railroad Plant and the Dairen Machinery Manufacturing Plant, both in Dairen, and at the Manchuria Locomotive and Rolling Stock (branch) Plant in Mukden. Only rolling stock was produced by one plant in Dairen, the Dairen Dock Iron Works, and at two plants in Mukden, the Manchuria Rolling Stock (main) Plant and the Manchuria Workshops. 2/

The USSR, during its occupation of Manchuria, removed much of the equipment from these plants. 3/ In 1947, under Nationalist control, only 20 locomotives and 500 freight cars were produced, all at the Mukden Locomotive and Rolling Stock (Huang-ku-t'un) Combined Plant.* 4/ In 1948 the production plans of the Nationalists called for an output of 36 locomotives and 624 freight cars (again only from the Mukden plant), but loss of Manchuria to the Chinese Communist armies by 30 October 1948 probably meant little or no production in that year. Since 21 September 1949 the Manchurian plants have been under the control of the Chinese Communists. 5/

2. China Proper.

Locomotives and rolling stock were not produced in China proper before 1937. Workshops at T'ang-shan, Ssu-fang, and Ch'ang-hsin-tien had facilities for both repair and assembly of railroad equipment but had little ability to manufacture parts for assembly, since the Chinese were able to purchase most of such equipment in the US. 6/ After the Japanese occupation of North China in 1937 the shops in Ssu-fang and T'ang-shan were enlarged and equipped for locomotive and rolling stock production. 7/ After the end of World War II the Chinese Nationalists made plans to reconstruct and equip the workshops at Chu-chou (27°50' N - 113°09' E) with UNRRA aid. In 1949, reconstruction was far from complete (see Figs. 2, 3, 4, and 5),** and indications are that the Chinese Communists have not been able to finish the project satisfactorily. 8/

* When the Nationalist Government reoccupied Mukden, the remaining production equipment for the three Mukden plants was pooled and installed at a single plant site.

** Following p. 6, below.

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S-E-C-R-E-T3. Present Status.

Thus at present the Chinese Communists have a total of nine primary plants which have at some time been engaged in railroad equipment (main-line) production.* None of these plants was planned, built, or equipped, to any appreciable extent, by the Chinese Communists.

C. Technology.

The production techniques of the Chinese Communists are undoubtedly a mixture of technology inherited from Japanese influence and acquired from Soviet technicians recently or presently on loan from the USSR. Aside from the influence of these modern techniques, many of the work methods are probably influenced by the vast amount of cheap labor available. Though there is no specific information on the point, it is reasonable to suppose that where manpower can be used in place of machinery, it is used and that where manpower cannot be used, modern methods of production are used. Such a condition would allow for future claims of large gains in labor productivity, even though production remains at a relatively low level. By the same token, production may increase in the future with no gain, or even with a loss, in labor forces.

D. Administrative Organization of the Industry.

The plants producing railroad equipment in Communist China are under the administrative control, not of a transport and heavy machine building ministry or similar ministry as in the USSR, but of the Rolling Stock Bureau of the Ministry of Railways. 9/ The reason for this difference in organizational structure is presumably that, even though these plants produce some items of new equipment, they are primarily engaged in the repair of present inventories. On this basis, the Chinese solution is consistent with Soviet practice, for repair facilities in the USSR are under the administrative jurisdiction of the service ministry.

* See Part II, A, below, for plant-by-plant production estimates as well as over-all production estimates.

S-E-C-R-E-TII. Supply.A. Production.

Production will be considered in three ways: first, on a plant-by-plant basis; second, on an over-all basis, considering those reports which deal with actual, planned, or capacity production in the aggregate; and third, on the basis of a collation of the plant-by-plant and over-all estimates, evaluating each against the other and arriving at a final estimate of production with an appropriate range of error.

1. Plant-by-Plant.

The "Estimated Actual Production" figures given below (for the years 1947-53) are intended to represent only a rough approximation of possible maximum capacity in those years, and thus indicate an upper limit for production.

a. Locomotive and Rolling Stock (Huang-ku-t'un) Combined Plant in Mukden.

The Locomotive and Rolling Stock (Huang-ku-t'un) Combined Plant in Mukden is the result of a consolidation of the equipment that remained in three plants at Mukden after the Soviet dismantling in 1945-46.* Table 1** shows total actual production at these three plants from 1941 through 1944, 1944 capacity, and planned production from 1944 through 1948 as projected by the Chinese Nationalists before Soviet dismantling began. It also shows actual 1947 production at the combined plant and planned production from 1948 through 1956 at the combined plant as estimated by the Chinese Nationalists. It should be remembered, here, that the plans made by the Chinese Nationalists were undoubtedly projected with considerable reliance on future US and/or UNRRA aid. 10/

Actual production in 1948 at the combined plant in Mukden has been reported at 20 locomotives and 187 freight cars. 11/
Capacity for locomotive production in 1951 has been estimated at 20

* The three original plants were Manchuria Locomotive and Rolling Stock Company, Manchuria Rolling Stock (main) Plant, and Manchuria Workshops.

** Table 1 follows on p. 8.

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Table 1

Chinese Nationalist Estimates and Plans
for Railroad Equipment Production in Mukden 12/
1941-56

Units: Each

Year	Type of Estimate	Total Production of Three Original Plants		Production at Combined Plant		
		Locomotives	Freight Cars	Locomotives	Freight Cars	Passenger Cars
1941	Actual	24	703			
1942	Actual	22	954			
1943	Actual	26	981			
1944	Actual	28	651			
1944	Capacity	50	1,800			
1944	Plan a/	50	N.A.			
1945	Plan a/	75	N.A.			
1946	Plan a/	80	N.A.			
1947	Plan a/	100	N.A.			
1948	Plan a/	120	N.A.			
1947	Actual			20	500	0
1948	Plan			36	624	0
1949	Plan			48	624	0
1950	Plan			60	684	0
1951	Plan			72	1,110	0
1952	Plan			80	1,200	18
1953	Plan			80	1,200	30
1954	Plan			80	1,200	50
1955	Plan			80	1,200	70
1956	Plan			80	1,200	80

a. Plan made before dismantling.

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units. 13/ [redacted] locomotive production in 1950 at 10
units, 14/ [redacted] the plant in 1950 as the most
important in Manchuria believed to be engaged in repair work. 15/

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Table 2 shows estimates of actual production of railroad equipment at the combined plant in Mukden under the Nationalists in 1947 and the first half of 1948 and under the Communists since that time.

Table 2

Estimated Actual Production of Railroad Equipment
at the Locomotive and Rolling Stock (Huang-ku-t'un) Combined Plant
in Mukden
1947-53

Units: Each							
Item	1947	1948	1949	1950	1951	1952	1953
Locomotives	20	20	5	10	15	20	25
Freight Cars	500	187	400	700	1,100	1,200	1,200
Passenger Cars	0	0	0	0	0	Negligible	Negligible

Employment at the combined plant in Mukden has been reported as 2,000 in 1949 and 3,000 in 1950 as compared with well over 3,500 in 1942. On this basis, too, the production estimates for 1949 and 1950 in Table 2 are not unrealistic.

b. South Manchurian Railroad Plant in Dairen.

Table 3* [redacted]
shows actual production at the South Manchurian Railroad Plant in Dairen (in the Sha-ho-k'ou section) from 1941 through 1944, capacity in 1944, planned production from 1944 through 1948 as projected by the Chinese Nationalists before Soviet dismantling, actual 1947 production, and planned 1948-56 production as estimated by the Chinese Nationalists.

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* Table 3 follows on p. 10.

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Table 3

Chinese Nationalist Estimates and Plans
for Railroad Equipment Production
at the South Manchurian Railroad Plant in Dairen 17/
1941-56

Units: Each

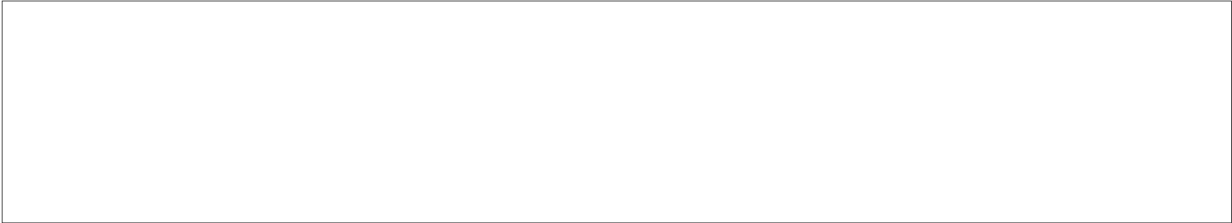
<u>Year</u>	<u>Type of Estimate</u>	<u>Locomotives</u>	<u>Freight Cars</u>	<u>Passenger Cars</u>
1941	Actual	27	499	N.A.
1942	Actual	42	417	N.A.
1943	Actual	47	286	N.A.
1944	Actual	37	132	0
1944	Capacity	70	800	N.A.
1944	Plan <u>a/</u>	70	N.A.	N.A.
1945	Plan <u>a/</u>	100	N.A.	N.A.
1946	Plan <u>a/</u>	100	N.A.	N.A.
1947	Plan <u>a/</u>	100	N.A.	N.A.
1948	Plan <u>a/</u>	100	N.A.	N.A.
1947	Actual	0	0	0
1948	Plan	0	0	0
1949	Plan	35	150	0
1950	Plan	48	200	0
1951	Plan	70	250	0
1952	Plan	80	300	12
1953	Plan	90	300	20
1954	Plan	100	300	30
1955	Plan	100	300	40
1956	Plan	100	300	50

a. Plan made before dismantling.

and rolling stock. 18/ Soviet dis-
mantling was extensive, if not complete, and that there has been a
continuing shortage of skilled workers since the evacuation of the

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Japanese, 19/ indicating that a mass exodus of Japanese technicians occurred after the plant was dismantled.



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It seems reasonable to accept [redacted] that recovery at this plant was very slow, in view of the fact that US aid was not supplied as planned by the Nationalists and that there has been little firm evidence of any effort by the USSR to aid materially in re-equipping the plant [redacted]

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Production estimates for the period 1947 through 1953 have been made on this basis. These estimates, shown in Table 4, represent a probable maximum.

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Table 4

Estimated Actual Production of Railroad Equipment
at the South Manchurian Railroad Plant in Dairen.
1947-53

Units: Each							
Item	1947	1948	1949	1950	1951	1952	1953
Locomotives	0	0	0	0	Negligible	18	20
Freight Cars	0	0	Negligible	75	150	225	300
Passenger Cars	0	0	0	0	0	0	0

c. Dairen Machinery Manufacturing Plant in Dairen.

Table 5* shows actual production at the Dairen Machinery Manufacturing Plant from 1941 through 1944, 1944 capacity, planned production from 1944 through 1948 as projected by the Chinese Nationalists before Soviet dismantling, actual production in 1947, and planned production from 1948 through 1956 as estimated by the Chinese Nationalists.

* Table 5 follows on p. 12.

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Table 5

Chinese Nationalist Estimates and Plans
for Railroad Equipment Production
at the Dairen Machinery Manufacturing Plant in Dairen 22/
1941-56

Units: Each

<u>Year</u>	<u>Type of Estimate</u>	<u>Locomotives</u>	<u>Freight Cars</u>	<u>Passenger Cars</u>
1941	Actual	38	1,308	N.A.
1942	Actual	38	1,575	N.A.
1943	Actual	55	2,141	N.A.
1944	Actual	47	1,348	N.A.
1944	Capacity	80	1,800	N.A.
1944	Plan <u>a/</u>	80	N.A.	N.A.
1945	Plan <u>a/</u>	100	N.A.	N.A.
1946	Plan <u>a/</u>	125	N.A.	N.A.
1947	Plan <u>a/</u>	150	N.A.	N.A.
1948	Plan <u>a/</u>	180	N.A.	N.A.
1947	Actual	0	0	0
1948	Plan	0	0	0
1949	Plan	0	0	0
1950	Plan	12	200	0
1951	Plan	28	500	0
1952	Plan	60	1,000	0
1953	Plan	90	1,500	20
1954	Plan	120	1,800	50
1955	Plan	120	2,000	80
1956	Plan	120	2,000	120

a. Plan made before dismantling.

It appears that almost all the equipment was removed from the Dairen Machinery Manufacturing Plant by the USSR. 23/ Some attempt has been made by the USSR to return at least part of the equipment confiscated, but recovery was still far from complete in 1950. 24/ No [] production of main-line locomotives or rolling stock since 1945. [] crane production started in 1950, that the plant also produced small freight

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cars and machinery, and that all production went to the USSR. ^{25/}
The inference is that the plant is being (or has been) re-equipped
by the USSR with the provision that the production of the plant
shall be sent to the USSR.

[redacted] the premises
stated above in connection with the South Manchurian Railroad Plant
in Dairen, production for the Dairen Machinery Manufacturing Plant
for the period 1947 through 1953 is estimated as shown in Table 6.

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Table 6

Estimated Actual Production of Railroad Equipment
at the Dairen Machinery Manufacturing Plant in Dairen
1947-53

Units: Each							
Item	1947	1948	1949	1950	1951	1952 ^{a/}	1953 ^{a/}
Locomotives	0	0	0	0	0	Negligible	12
Freight Cars	0	0	0	0	0	Negligible	200
Passenger Cars	0	0	0	0	0	0	0

a. Production of main-line railroad equipment in 1947 and later
years has not been established. Estimates shown for 1952 and 1953
are therefore subject to the qualification that the correct esti-
mate for these years may in fact be zero.

d. Manchuria Rolling Stock Manufacturing Plant in Dairen.

Before the dismantling of plants by the USSR, the
Manchuria Rolling Stock Manufacturing Plant in Dairen was a branch
plant of the Manchuria Rolling Stock Plant in Mukden. When the three
plants in Mukden were combined, the organizational status of the
branch plant became unknown. It does not appear to be a subsidiary
to the combined plant in Mukden. An examination of maps and city
plans showing the area covered by this plant shows conclusively that
the plant has always been engaged in the assembly of freight cars
rather than in the production of freight cars in the sense of internal

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plant fabrication of parts. 26/ Table 7 shows actual production (assembly) from 1941 through 1944, planned production in 1944, actual production in 1947, and planned production from 1948 through 1956 as estimated by the Chinese Nationalists.

Table 7

Chinese Nationalist Estimates and Plans
for Freight Car Production (Assembly)
at the Manchuria Rolling Stock Manufacturing Plant in Dairen a/ 27/
1941-56

Units: Each		
<u>Year</u>	<u>Type of Estimate</u>	<u>Freight Cars</u>
1941	Actual	645
1942	Actual	630
1943	Actual	668
1944	Actual	481
1944	Plan	800
1947	Actual	0
1948	Plan	0
1949	Plan	0
1950	Plan	100
1951	Plan	200
1952	Plan	400
1953	Plan	500
1954	Plan	700
1955	Plan	800
1956	Plan	800

a. This plant does not have facilities for the production (assembly) of passenger cars or locomotives.

the Manchuria Rolling Stock Manufacturing Plant in Dairen indicates that the labor force in 1950 was of about the same size as it was under the Japanese but that skills and training of the workers were probably somewhat lower. 28/

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production (assembly) from 1947 through 1953, shown in Table 8, is assumed to have recovered at the rate planned by the Chinese Nationalists.

Table 8

Estimated Actual Production (Assembly) of Freight Cars
at the Manchuria Rolling Stock Manufacturing Plant in Dairen a/
1947-53

Units: Each	
<u>Year</u>	<u>Production</u>
1947	0
1948	0
1949	0
1950	100
1951	200
1952	400
1953	500

a. This plant does not have facilities for the production (assembly) of passenger cars or locomotives.

e. Dairen Dock Iron Works in Dairen.

While the Dairen Dock Iron Works was under the control of the Japanese and, later, of the Chinese Nationalists, it was engaged in the assembly of freight cars with imported parts. 29/ Chinese Nationalist estimates of actual production from 1941 through 1944, 1944 capacity, actual production in 1947, and planned production (assembly) from 1948 through 1950 are shown for this plant in Table 9.*

in the Dairen Iron Works since 1949. It is possible that assembly operations have again been undertaken by the Communists. To allow for this possibility, production (assembly) of freight cars from 1947 through 1953 has been estimated on the basis of the Chinese Nationalist plans. This estimate, which is given to establish maximum figures, is shown in Table 10.**

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* Table 9 follows on p. 16.

** Table 10 follows on p. 16.

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Table 9

Chinese Nationalist Estimates and Plans
for Freight Car Production (Assembly)
at the Dairen Dock Iron Works in Dairen a/ 30/
1941-56

Units: Each		
<u>Year</u>	<u>Type of Estimate</u>	<u>Freight Cars</u>
1941	Actual	564
1942	Actual	506
1943	Actual	532
1944	Actual	386
1944	Capacity	800
1947	Actual	0
1948	Plan	0
1949	Plan	200
1950	Plan	300
1951	Plan	400
1952	Plan	600
1953	Plan	700
1954	Plan	700
1955	Plan	700
1956	Plan	700

a. This plant does not have facilities for the production (assembly) of passenger cars or locomotives.

Table 10

Estimated Actual Production (Assembly) of Freight Cars
at the Dairen Dock Iron Works in Dairen a/
1947-53

Units: Each	
<u>Year</u>	<u>Production</u>
1947	0
1948	0
1949	200
1950	300
1951	400
1952	600
1953	700

a. This plant does not have facilities for the production (assembly) of passenger cars or locomotives.

S-E-C-R-E-Tf. Railroad Equipment Repair Shop in T'ang-shan.

The Railroad Equipment Repair Shop in T'ang-shan is one of the larger facilities in China proper. [redacted]

[redacted] the plant is probably wholly occupied with repair work.

[redacted] locomotives were being produced there, but [redacted]

[redacted] indicate the capital repair of old locomotives rather than the production of new equipment. The plant probably has the capacity for the production (or assembly) of some new equipment, but it is estimated that through 1953 no production of railroad equipment has actually taken place. 31/

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50X1g. Ssu-fang Railroad Shop in Tsingtao.*

Under the Chinese Nationalists the Ssu-fang Railroad Shop in Tsingtao was engaged primarily in repair work on railroad equipment with possibly some assembly of imported parts. [redacted]

[redacted] no locomotives were produced prior to 1952 and that probably few, if any, freight cars were built prior to this date. 32/ Maximum locomotive production capacity has been estimated at 25 units per year. 33/ The maximum freight car capacity has been reported as 1,800 freight cars per year. 34/

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On 26 July 1952 Ssu-fang Railroad Shop completed its first locomotive. 35/ It was widely heralded by the Chinese Communist press as the first locomotive built with materials wholly of Chinese origin. 36/ Production in 1952 was reported to have reached a total of about 16 units, of which at least 4 were declared inoperable unless modified. The production quota for 1952 had been set by the Ministry of Railways at 24 units.

[redacted] freight car manufacture at the Ssu-fang Railroad Shop in Tsingtao was not at capacity in 1952 but suffered rather sharply from the priority placed on locomotive construction. Production estimates from 1947 through 1953 are shown in Table 11.**

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* See Figures 6, 7, and 8, following p. 18, below.

** Table 11 follows on p. 18.

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Table 11

Estimated Actual Production of Railroad Equipment
at the Ssu-fang Railroad Shop in Tsingtao
1947-53

Units: Each							
Item	1947	1948	1949	1950	1951	1952	1953
Locomotives	0	0	0	0	0	16	24
Freight Cars	0	0	0	225	450	600	900
Passenger Cars	0	0	0	0	0	0	0

h. Chu-chou Locomotive Works.*

The Chu-chou Locomotive Works is a large plant, reported to have been completely destroyed by the Japanese. Reconstruction was undertaken by the Nationalists and was scheduled for completion in 1951. The proposed capacity of the plant was reported to be 85 locomotives, 850 freight cars, and 85 passenger cars per year. A lack of power capacity was reported in 1949. 37/ [redacted]

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"The Chinese Communist Government has approved a resolution to build a National Defense Industrial Center at Chu-chou to begin operation in 1953. Plans include expansion of railway factory to produce steel bars and to perform major locomotive overhauls." 38/ [redacted]

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[redacted] the plant completed part of an order for freight cars. 39/ It seems likely that the Chu-chou plant has completed few, if any, locomotives and but few freight cars.

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[redacted] the planned facilities which are to be constructed at Chu-chou indicates a total floor area of 1.1 million square feet. 40/ A locomotive plant designed by the Baldwin Locomotive Works** in 1943 for the production of 100 steam locomotives per year requires approximately 1.25 million square feet, as does a railroad passenger car plant for the production of 100 units per year. 41/

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* See Figures 2, 3, 4, and 5, following p. 4, above, for photographs taken at this location in 1949.

** Merged with the Lima-Hamilton Corporation on 30 November 1950, the new combine becoming the Baldwin-Lima-Hamilton Corporation, of Philadelphia, Pennsylvania.

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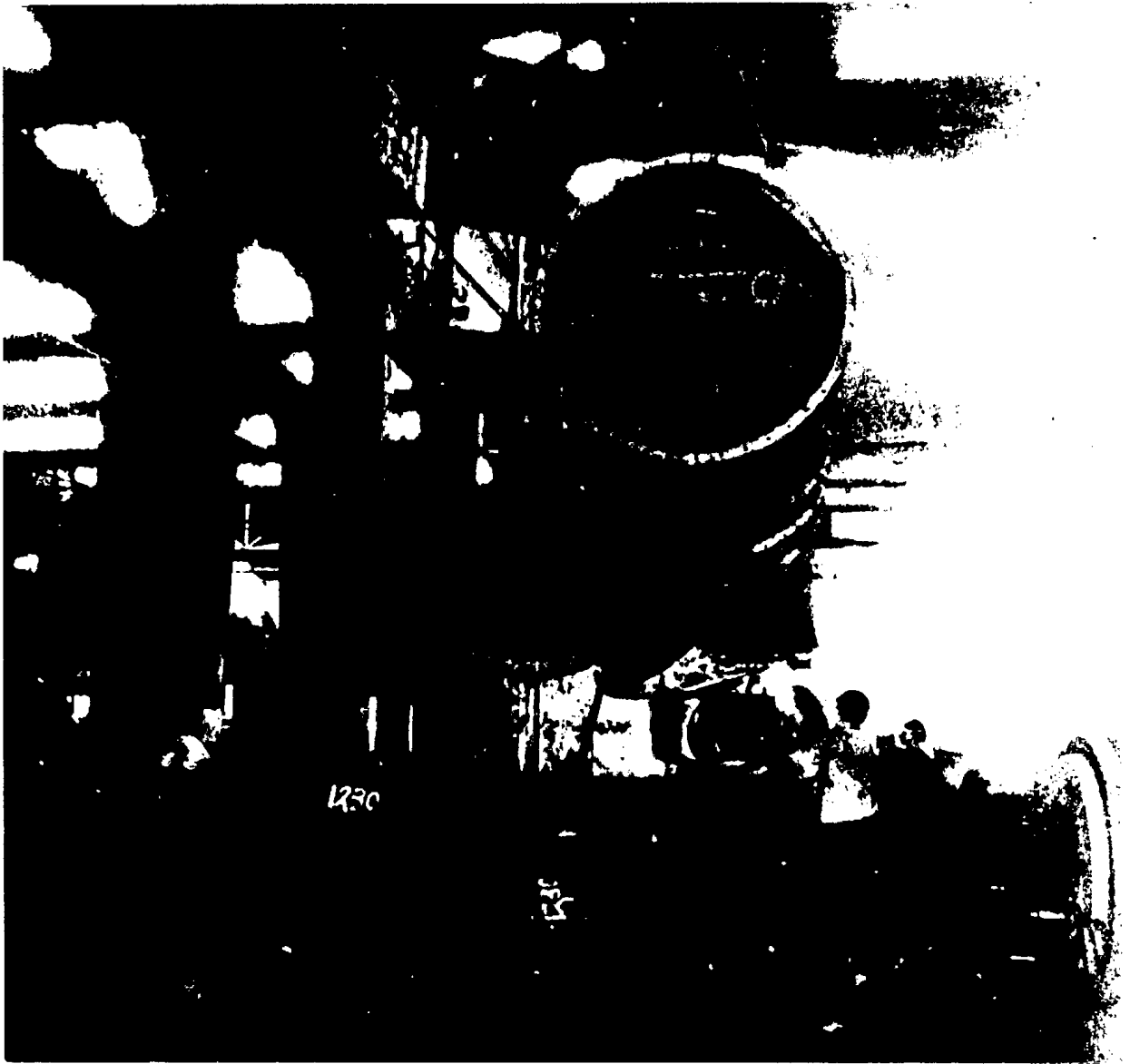


FIGURE 6. Boiler Being Hoisted into the Frame of the First China-Made Locomotive, Ssu-fang Railroad Shop, September 1952.

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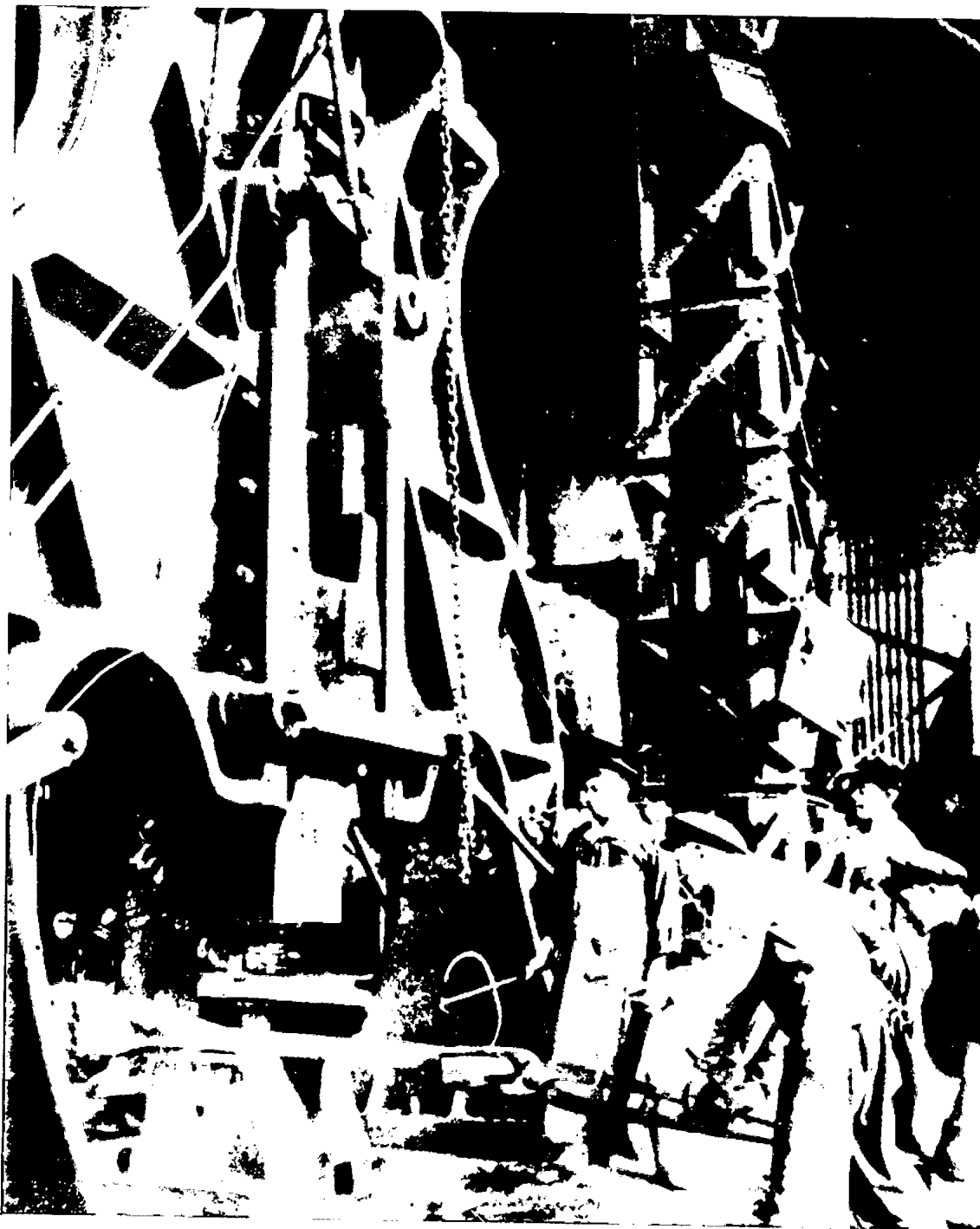


FIGURE 7. Scene in the Forge Shop of the Ssu-fang Railroad Shop in Tsingtao, September 1952.

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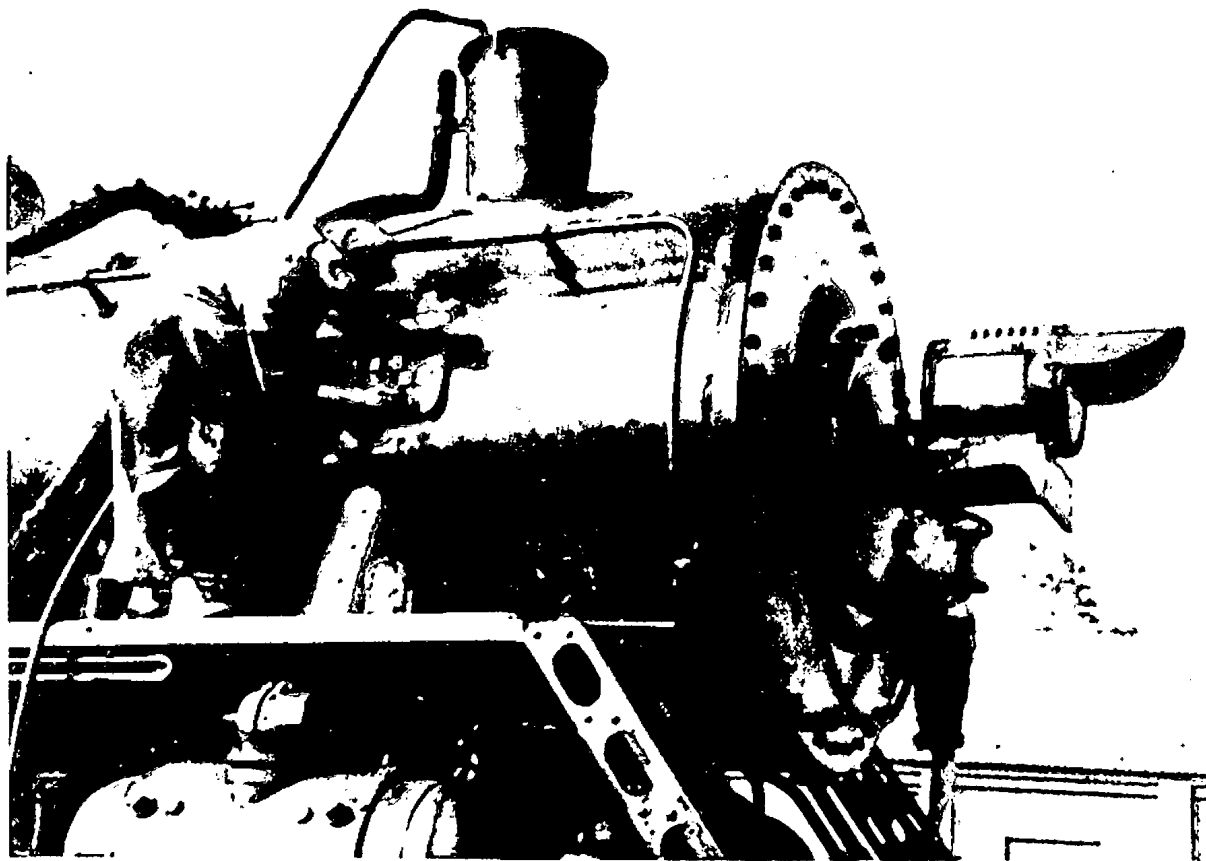


FIGURE 8. Front-End View of the First China-Made Locomotive, Ssu-fang Railroad Shop, September 1952. The Communists claim that the first locomotive built at Ssu-fang is the first locomotive built in China "wholly of parts of Chinese origin." Note the serial number 2102 on the headlight plate.

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Similar figures for freight car production are not available, but an assumption that the ratio might be 10 freight cars per passenger car does not seem too unrealistic. On this basis, 3.75 million square feet would be required for the production of 100 locomotives, 1,000 freight cars, and 100 passenger cars per year. The Chu-chou plant, therefore, with 1.1 million square feet, would have a capacity of about 30 locomotives, 300 freight cars, and 30 passenger cars. In view of the fact that this facility is also to be a "huge" repair center, one could assume that only about one-half of the available area would be devoted to manufacture, leaving capacity for the production of 15 locomotives, 150 freight cars, and 15 passenger cars per year. That this estimate of capacity is not too low is indicated by the figure for the power supply which is planned for the Chu-chou plant -- 1,500 kilowatts -- as compared with the power supply which Baldwin estimates would be necessary for the production of 100 locomotives per year -- 8,700 kilowatts. Ignoring all other manufacture and repair activities, the planned power supply for the Chu-chou plant would be sufficient for only some 18 locomotives per year, on the basis of the Baldwin figures.

On the basis of this reasoning, production at the Chu-chou plant from 1947 through 1953 is estimated as shown in Table 12.

Table 12

Estimated Actual Production of Railroad Equipment
at the Chu-chou Locomotive Works in Chu-chou
1947-53

Units: Each							
Item	1947	1948	1949	1950	1951	1952	1953
Locomotives	0	0	0	Negligible	5	15	18
Freight Cars	0	0	Negligible	50	100	150	180
Passenger Cars	0	0	0	Negligible	5	15	18

i. Railroad Equipment Repair Shop in Ch'ang-hsin-tien.

[redacted] the Railroad Equipment Repair Shop in Ch'ang-hsin-tien, when under Chinese Nationalist control, had the facilities for both repair and assembly. 43/ [redacted]

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2. Over-All.

Table 13 summarizes [redacted] total production of railroad equipment in China from 1941 through 1952. Figures for 1941-44 are from an authoritative Chinese document. [redacted] they are considered in general to be a better basis for an estimate of total production than the scanty plant information available for those years.

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Table 13

Reported Production of Railroad Equipment in China a/
1941-52.

Units: Each			
Year	Locomotives	Freight Cars	Passenger Cars
1941 44/	89	3,779	N.A.
1942 45/	102	4,082	N.A.
1943 46/	128	4,608	N.A.
1944 47/	112	2,998	N.A.
1945	N.A.	N.A.	N.A.
1946	N.A.	N.A.	N.A.
1947 48/	20	500	0
1948 49/	9	130	2
1949 50/	N.A.	322	55
1950 51/	N.A.	800 (Plan - 1,500)	N.A.
1951	20 52/	619 to 1,000 53/	N.A. 54/
1952 55/	110 (Plan) b/ 56/	1,200 57/	125 (Plan) b/ 58/
1948-51 59/	150 (Plan)	7,000 (Plan)	300 (Plan)

- a. Including Manchuria and China proper.
b. Planned production and repair.

One other item of information is available on total production. Peiping Radio on 24 December 1952 made the following statement: "China's production plan for new locomotives and wagons has

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been completed three weeks ahead of schedule. The output of locomotives was 50 percent and wagons 4 percent above plan, This not only expands existing railway transport capacity, but lays the foundation for the mass production of rolling stock in the coming years." 60/

3. Collation of Plant-by-Plant and Over-All Estimates.

Table 14* is an evaluated collation of the two preceding sections on plant-by-plant and over-all production for the years 1941 through 1953 and a range of error for estimated total production in each year.

Table 14, then, represents the most highly evaluated estimate of the production of railroad equipment in China. As noted above in connection with Table 13, the reported figures for 1941-44 are accepted as authoritative. Reported figures for 1946 and 1947 are also accepted as the best estimate. For other years, the best estimate is shown and is followed by a range of estimation. Considered analysis of the industry indicates that the best estimate in most cases should be at or near the low limit of the range, which is generally the limit provided by over-all reported figures. The upper limit of the range is obtained by totalling plant estimates, which cannot be evaluated individually but are believed to represent collectively a very high estimate. Actual production is believed to lie within the range shown, but the "best estimate" figures shown must necessarily be qualified by the fact that they reflect slight information, conflicting reports, and possibly intuitive prejudgment (although every attempt has been made to exclude the latter).

[Redacted]

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[Redacted]

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* Table 14 follows on p. 22.

[Redacted]

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Table 14

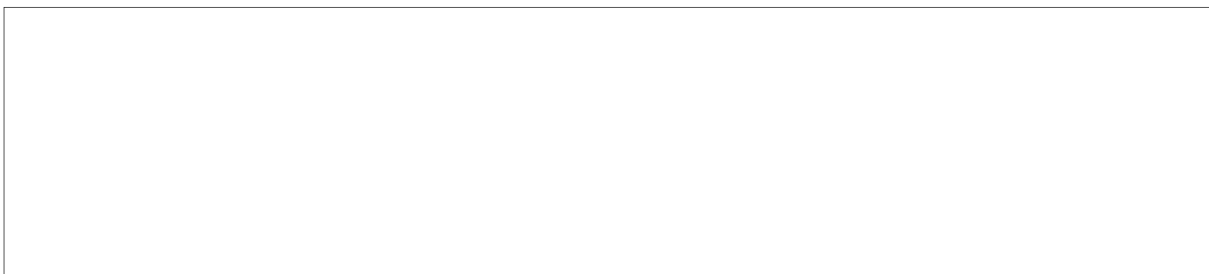
Estimated Actual Production of Railroad Equipment in China a/
1941-53

Units: Each			
Year <u>b/</u>	Locomotives	Freight Cars	Passenger Cars
1941	89	3,779	N.A.
1942	102	4,082	N.A.
1943	128	4,608	N.A.
1944	112	2,998	N.A.
1945			
(1 Jan - 5 Aug)	64 (0 to 64)	2,300 (0 to 2,300)	N.A.
1945			
(5 Aug - 31 Dec)	0	0 (0 to Negligible)	0
1946	Negligible	Negligible	0
1947	20	500	0
1948			
(1 Jan - 30 Oct)	9 (9 to 20)	130 (130 to 187)	2 (0 to 2)
1948			
(31 Oct - 31 Dec)	0 (0 to Negligible)	0 (0 to Negligible)	0
1949	5 (0 to Negligible)	322 (322 to 600)	0
1950	10 (5 to 15)	800 (800 to 1,500)	Negligible
1951	20 (15 to 25)	1,000 (1,000 to 2,400)	5 (0 to 5)
1952	60 (50 to 70)	2,000 (2,000 to 3,175)	15 (10 to 20)
1953	85 (70 to 100)	2,500 (2,500 to 4,000)	20 (15 to 25)

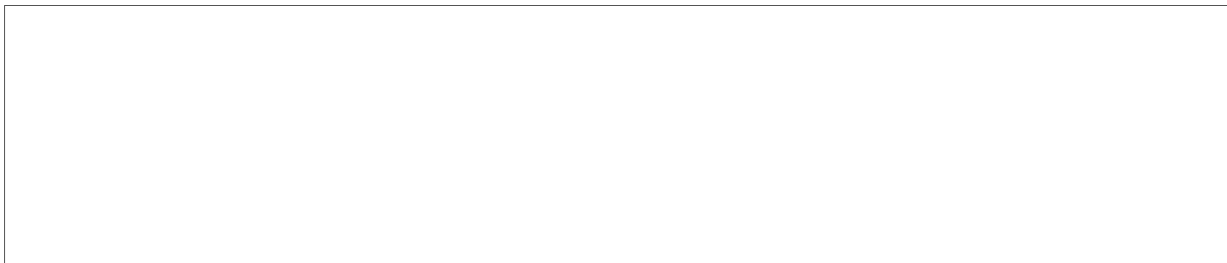
a. The range of the estimate, when appropriate, is shown in parentheses after the estimate. All of the estimates in this table include as production a great deal of assembly of imported parts. For an estimate of Communist China's capabilities to produce railroad equipment wholly from domestic components, see VII, A, below.

b. 1941 to 5 Aug 1945: the figures shown are for Manchuria only. There was no production in China proper in this period, although there may have been considerable assembly of imported parts. 5 Aug 1945 to 30 Oct 1948: the figures shown are for Nationalist China as defined in I, B, above. 31 Oct 1948 through 1953: the figures shown are for Communist China as defined in I, B, above.

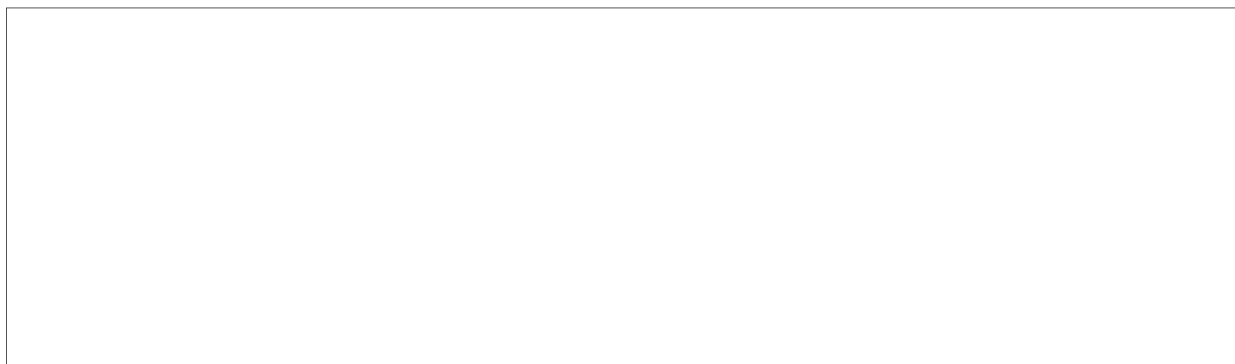
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B. Imports.

During the years prior to 1945, railroad equipment of all types, including parts, was imported by the various railroads of the Republic of China and by Manchukuo. Equipment and parts were imported from many countries including the US, Japan, the UK, Germany, Czechoslovakia, and Poland.*** 62/ No attempt to estimate the total value or physical



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*** For locomotives imported from Czechoslovakia, see Figures 9 and 10, following p. 24, below. The wheel arrangement of a steam locomotive is commonly expressed by means of three figures denoting the number of wheels on the leading truck, the driving gear, and the trailing truck, respectively. Thus a 2-8-0 wheel arrangement indicates a locomotive with 2 wheels on the leading truck, 8 driving wheels, and no trailing truck.

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quantity of these imports will be made here. It is only necessary to note that in the Republic of China (China proper) there was complete dependence upon imports of railroad equipment and parts and that in Manchukuo, although there was some development of native industry by the Japanese, the dependence upon Japan for parts and technical aid precluded what could be called "domestic" production.

Imports have continued to be vital to Communist China.

1. Locomotives.

Insofar as it has been possible to determine, there has been little import by sea of main-line steam locomotives since the beginning of the Communist regime. [redacted] some imports of Polish locomotives and [redacted] parts imports in varying quantities. 63/ [redacted] imports of locomotives by rail from the USSR. 64/ [redacted] these imports have been either frequent or large in amounts. There is some basis for considering the possibility that many of the locomotives received from the USSR were in fact originally Manchurian units confiscated earlier by the USSR and recently returned as "new" units. 65/ No firm estimate can be made, but imports during the years 1950 through 1953 may have ranged from 15 to 40 main-line locomotives per year.

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2. Freight Cars.

[redacted] in 1950 some 500 tank cars of Soviet construction were sent to Communist China by the USSR. 66/ Whether these cars were a gift or a purchase is not known. It seems probable that the purpose of the transfer was to aid the Chinese Communists in the prosecution of the Korean War. [redacted] imports of freight cars from Poland and East Germany. 67/ [redacted] A firm estimate of freight car imports from 1950 through 1953 is not possible. Allowing for the paucity of information, it seems probable that imports during these 4 years have not totalled over 500 cars per year and that after 1950 the total per year probably was about 300 cars per year.

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3. Passenger Cars.

On imports of passenger cars there is even less information than on imports of locomotives and freight cars. [redacted]

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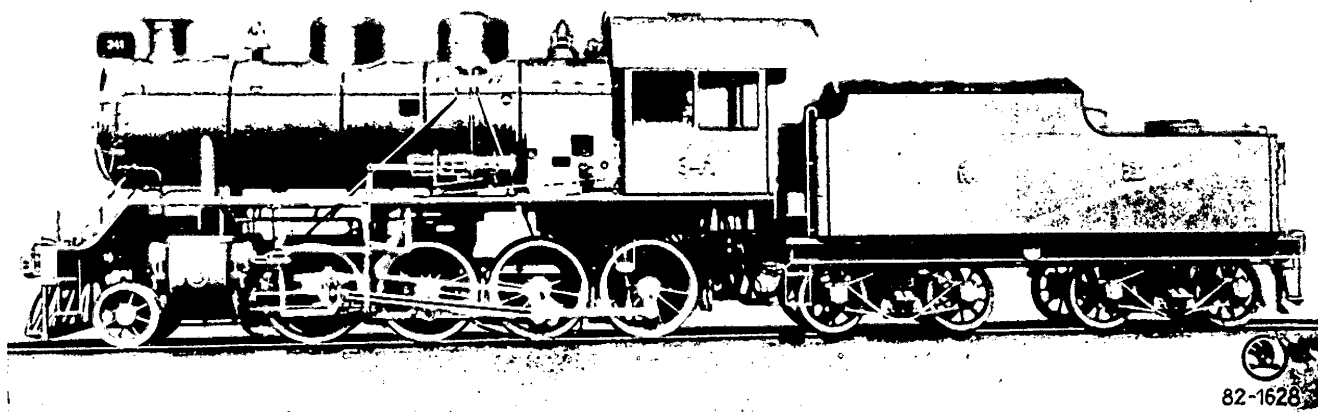


FIGURE 9. 2-8-0 Twin-Cylinder Steam Locomotive Imported from Czechoslovakia for the Chinese State Railways Prior to 1948.

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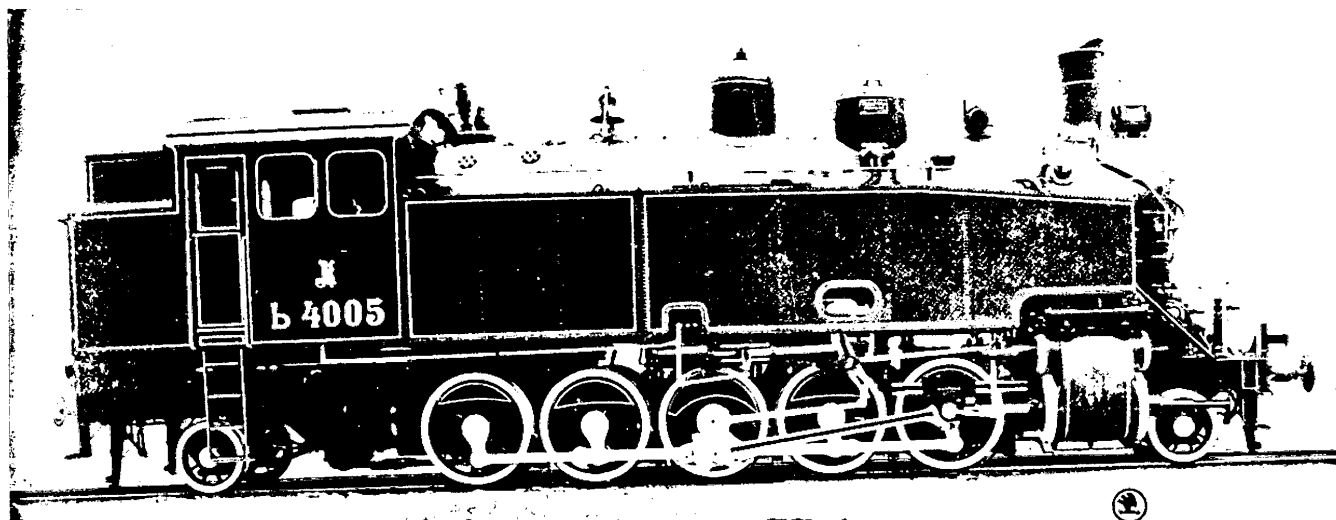


FIGURE 10. 2-10-0 Twin-Cylinder Tank Steam Locomotive Imported from Czechoslovakia for the Chinese Eastern Railway Prior to 1948.



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[] an import of 20 units from Hungary in 1952. ^{68/} It seems probable that total imports per year in 1950 through 1953 did not exceed this figure.

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4. Railroad Equipment Parts.

There is even less precise information about imports of parts. That imports of parts have been extensive seems well documented. ^{69/} This belief is supported by the information available on production discussed earlier. Production of even the minimum amounts estimated in Table 14* would have required the import of considerable amounts of railroad equipment parts.

No estimate of the tons of parts actually imported is available, and until a more detailed breakdown of the activities at the various production facilities can be made, it will not be possible to estimate the actual total amounts of parts required each year.

C. Inventory.

The inventory of steam locomotives at the end of 1952 has been tentatively estimated at about 3,000, and the inventory of freight cars at the end of 1952 at 56,000 (plus or minus 4,000). No estimate of railroad passenger car inventories has been made. ^{70/}

III. Demand.

The supply of sufficient numbers of new units of locomotives and rolling stock to meet the requirements of retirement, accident, and increase in freight haulage is essential to the efficient operation of any railroad system and the development of any industrial economy.

In the light of the production and import estimates in II, A, and B, above, the conclusion which must be drawn is that domestic production has been well below total supply. Considering the probability that a large percentage of the parts used in the estimated "domestic" production were imported, the level of actual production falls far below total supply, and therefore below the essential requirements of Communist China.**

* P. 22, above.

** In this context, minimum essential requirements equal production plus imports. Any determination of essential requirements on an operational basis is outside the frame of reference of this report.

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There is no substitute for a supply of new railroad equipment: Requirements for new equipment may be deferred by means of over-utilization and intensive maintenance of the existing park, together with repair of obsolescent and depreciated equipment. A policy such as this can be continued for several years with an even, or decreasing, traffic load, but it is doubtful if a growing industrial economy could withstand the cumulative effects of such a policy for a long period of time.

IV. Expansibility.A. Existing Capacity.

The upper limit of the production estimate for the years 1949 through 1953, shown in Table 14, above, is regarded as the same as the maximum capacity of Communist China to produce railroad equipment in those years. This maximum capacity is tabulated in Table 15.

Table 15

Estimated Railroad Equipment Production Capacity
in Communist China
1949-53

Units: Each			
<u>Year</u>	<u>Locomotives</u>	<u>Freight Cars</u>	<u>Passenger Cars</u>
1949	5	600	0
1950	15	1,500	Negligible
1951	25	2,400	5
1952	70	3,175	20
1953	100	4,000	25

B. Normal Growth of Production and Capacity through 1955.

In order to estimate normal production and capacity growths through 1955, the method chosen was the extrapolation of the 1949-53 estimates. This method, although mechanical, is currently the only means available, other than mere guessing, for estimating Communist

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China's possible course of action in developing the railroad equipment industry. Table 16 summarizes this extrapolation.

Table 16

Estimated Normal Growth of Production and Capacity
of the Railroad Equipment Industry
in Communist China a/
1954 and 1955

Units: Each		
Item	1954	1955
Production		
Locomotives	115 (95 to 135)	140 (115 to 160)
Freight Cars	3,400 (3,400 to 4,900)	4,300 (4,300 to 5,800)
Passenger Cars	27 (22 to 32)	33 (28 to 38)
Capacity		
Locomotives	135	160
Freight Cars	4,900	5,800
Passenger Cars	32	38

a. Range for production estimates follows estimate in parentheses. No range is given for capacity, which is represented by the upper limit of the range given for production.

C. Expansion Possibilities by the End of 1956.

In order to make an estimate of expansion possibilities by the end of 1956, the following assumptions were made:

1. The Chu-chou Locomotive Works will be completed, equipped with machinery, and supplied with power so as to reach maximum planned production.

2. All the plants located in the Northeast (Manchuria) will be re-equipped as planned by the Chinese Nationalists after Soviet

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dismantling. Equipment for this refurbishing, manpower of the necessary technical skill, and materials of all types will be available. (It seems logical that this supply of needed items would have to come as a result of increased Soviet aid.)

3. The level of first and second echelon maintenance and repair work will be such that production shops will be released for their intended function.

4. The Ssu-fang Railroad Shop will reach capacity production by the end of 1956.

On these premises, then, the maximum capacity of Communist China for the production of railroad equipment by the end of 1956 is calculated at some 410 locomotives, 7,650 freight cars, and 335 passenger cars. 71/ These figures are not meant to be estimates of probable, actual, or capacity production in 1956; they are merely hypothetical values for maximum productive capacity if the four conditions stated above should be fully realized.

V. Inputs.

Until a thoroughly detailed study of inputs can be undertaken, reference should be made to previous CIA estimates of Soviet inputs per unit of output of railroad equipment. 72/ Any application of these inputs to the output figures estimated herein is subject to the range of error attributed to each of these estimates and to an unknown error inherent in applying figures adjusted for Soviet practices to Chinese production.

VI. Supplementary Plant Information.

In addition to those plants discussed earlier in connection with the plant-by-plant estimates there are other facilities which have received attention during the research phases of this report.

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S-E-C-R-E-TVII. Conclusions.A. Capabilities.

From the preceding discussion, it appears that Communist China was capable of producing perhaps 100 locomotives, 4,000 freight cars, and 25 passenger cars in 1953. The Chinese industry is heavily dependent, however, upon the import of component parts in order to reach this capacity production figure. Even with imported parts, moreover, Communist China is not capable of meeting its requirements for locomotives and rolling stock through domestic production. The evidence of imports of finished units of railroad equipment is one indicator of a lack of required capacity. A second indicator is the evidence that a sizable amount of the productive capacity is tied up in repair work. Some future reduction in repair work (that is, more efficient maintenance) might mean an increase in capacity.

One estimate, made before the assumption of control by the Chinese Communists, indicated a total yearly requirement of 775 locomotives and 15,400 freight cars. 82/ On this basis, even maximum capacity production in 1956 as calculated above would leave Communist China capable of producing only about 50 percent of its annual requirements.*

B. Vulnerabilities.

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Worthy of particular reference here, however, is the probable extreme vulnerability of the Chinese Communist railroad equipment industry to a cut-off in supplies of parts and subassemblies necessary to continued production. Although it has not been possible to estimate with any precision the extent to which the industry depends on

* This figure of 775 locomotives and 15,400 freight cars includes all of China and Korea. In addition, it is a pre-Chinese Communist estimate. It should be recognized, then, that the 50-percent figure is extremely tenuous and should be taken as indicative only of an order of magnitude.

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such imports, it appears clear that such dependence indeed exists and to a sizable degree.

C. Intentions.

Specific indicators of Chinese Communist intentions regarding the railroad equipment industry are few. The general impression gleaned from a study of many reports is that its growth will be held in line with the development of domestic industries capable of supplying its requirements. Eventually it is intended to become capable of meeting the needs of the Chinese Communist economy with only small imports of components.

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APPENDIX A

COMPARISON OF PRESENT AND PREVIOUS ESTIMATES

Table 18 compares this report with earlier ORR estimates.

Table 18

Present and Previous Estimates of Railroad Equipment Production
in Communist China a/
1950-53

Units: Each			
<u>Item</u>	<u>Year</u>	<u>Present Estimate <u>b/</u></u>	<u>Earlier ORR Estimate <u>83/</u></u>
Locomotives	1950	10 (5 to 15)	54 (27 to 81)
	1951	20 (15 to 25)	104 (52 to 156)
	1952	60 (50 to 70)	154 (77 to 231)
	1953	85 (70 to 100)	N.A.
Freight Cars	1950	800 (800 to 1,500)	2,200 (1,650 to 2,750)
	1951	1,000 (1,000 to 2,400)	3,500 (2,625 to 4,375)
	1952	2,000 (2,000 to 3,175)	4,800 (3,600 to 6,000)
	1953	2,500 (2,500 to 4,000)	N.A.
Passenger Cars	1950	Negligible	24
	1951	5 (0 to 5)	64
	1952	15 (10 to 20)	105
	1953	20 (15 to 25)	N.A.

a. The range of the estimate, when appropriate, is shown in parentheses after the estimate.

b. From Table 14, p. 22, above.

The earlier ORR estimate, which was a tentative interim estimate, was based, to a large extent, upon (1) statements of pre-1945 capacity together with the assumption that 1952 production would be near this capacity figure, (2) an assumption that Soviet aid would be provided in

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sufficient amounts to enable the Chinese Communists to completely refurbish their facilities, (3) an assumption that 1952 production would be about 50 percent of what was estimated by the Chinese Nationalists as possible in 1952, (4) insufficient consideration of some reports which indicate low rates of production in years after 1949, and (5) in the case of the 1950 and 1951 estimates, arbitrary interpolations between the 1949 and 1952 estimates. The estimate given in the present report is believed to be much more accurate, as a result mainly of more reliance on reported figures and less on assumptions.

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APPENDIX B

METHODOLOGY

The methodology used in this report is largely explained in the body of the text. Production estimates at individual plants were based on several factors, including (1) Chinese Nationalist production estimates for future years, (2) the amount of reported dismantling of equipment by the USSR. [REDACTED]

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[REDACTED] (5) manpower requirements, (6) reports of actual production at individual plants, and (7) consideration of the amount of repair work probably under way.

Estimates for individual plants were made on the basis of a consideration of the applicable factors in each case. These estimates are considered as maximum estimates for each plant.

Over-all production estimates were made on the basis of reports of actual production which could be highly evaluated. Because of the paucity of information, they may omit some production figures. A best estimate for each year was evolved on the basis of these reports and a summation of the plant estimates.

The over-all estimates are believed to reflect the most reliable data, while the range of estimates is such that the maximum and the minimum figures are believed to "box in" the possible range of error.

Import estimates were made on an over-all basis but are to some extent influenced by inference and weighted judgment.

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